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NATIONAL RESOURCES BUILDING
PEABODY EAST OF SOUTH SIXTH
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JOHN C. FAYE, CHIEF

Reed, V. S. / T

P. C. Box I
Warrenville, Illinois 60555
February 4, 1971

RECEIVED

FEB 08 1971

ENVIRONMENTAL PROTECTION AGENCY
CHICAGO OFFICE

Mr. Charles Clark
Chief, Bureau of Land Pollution Control
Environmental Protection Agency
2400 West Jefferson
Springfield, Illinois 62706

Dear Mr. Clark:

In re Cook County - Solid Waste Disposal
Chicago/Paxton Landfill Corp.

This is in response to your request for a description of the hydrogeology in the vicinity of a landfill site located near the center of Section 24, T. 37 N., R. 14 E., 3rd. PM, Cook County. A detailed description of the area is as follows:

Tract 1 - the N.W. $\frac{1}{4}$ of the S.W. $\frac{1}{4}$ of the N.E. $\frac{1}{4}$
Tract 2 - the W $\frac{1}{2}$ of the N.E. $\frac{1}{4}$ of the S.W. $\frac{1}{4}$ of the N.E. $\frac{1}{4}$
Tract 3 - the S.E. $\frac{1}{4}$ of the S.W. $\frac{1}{4}$ of the N.E. $\frac{1}{4}$
Tract 4 - the W. $\frac{1}{2}$ of the S.W. $\frac{1}{4}$ of the S.W. $\frac{1}{4}$ of the N.E. $\frac{1}{4}$
Tract 5 - the N.W. $\frac{1}{4}$ of the N.W. $\frac{1}{4}$ of the S.E. $\frac{1}{4}$
Tract 6 - the E. 1/8 of the S.E. $\frac{1}{4}$ of the N.W. $\frac{1}{4}$

We are enclosing a letter from Mr. Ronald A. Landon, formerly of the State Geological Survey, to Dr. Arthur Zeisel, dated October the 5th, 1964. Site - 2 described in this letter is located immediately south of the Chicago/Paxton Landfill site and the description given in Mr. Landon's letter will apply to that site, as well.

The Chicago Paxton Landfill site was visited on February 2, 1971. At the time of the visit, refuse was being deposited in a trench approximately $\frac{1}{4}$ mile north of the center of Section 24. Excavations south of this trench exposed approximately 5 feet of surficial sand. Although the base of this sand could not be seen, mounds of earth, which were apparently excavated from other trenches in the area, suggest that the materials beneath

Exhibit #3

Mr. Clark - 2

February 4, 1971

the sand consist of relatively impermeable silty clay tills.

As noted in Mr. Landon's letter, the area was originally low-lying and swampy, however, much of the original surface has been covered with various types of fill and, although, there are a number of excavations present, it was not possible to definitely determine the composition of the original materials. Borings would, therefore, be necessary to further define geological conditions in this area.

Yours truly,

George M. Hughes
George M. Hughes
Associate Geologist
Northeastern Illinois Office
Section of Ground-Water Geology
and Geophysical Exploration

GMH/jge
cc: Benn Leland
enc.

8303-01F

115, SECTION 10, T. 35N, R. 10E, IL - 0030-
S. 1/4, SECTION 10
15

SW 1/4, SECTION 10, T. 35N, R. 10E
SW 1/4, SECTION 10

SW 1/4, SECTION 10, T. 35N, R. 10E

115 South Washington Street
Springfield, Illinois 62701
October 5, 1964

Dr. Arthur Zoisel
PRIMAC
400 West Madison
Chicago, Illinois 60606

Dear Art:

This is in response to your letter of September 4, 1964, requesting a geologic evaluation of three sites in Cook County for an industrial landfill operation.

The Illinois State Geological Survey provides descriptions of geologic factors in the physical environment pertinent to the production and spread of contaminants arising from waste disposal at or near the surface. It does not attempt to determine whether pollution or contamination would or would not result from disposal of waste at a specific site, nor does it attempt to evaluate the relative importance of the geologic factors described. Such a conclusion would require consideration of other significant factors that are outside the area of responsibility of the Geological Survey.

The geologic factors which are given consideration in this report are:

1. The potential for saturation of disposed refuse by ground water or surface flooding.
Solid wastes disposed of in a saturated environment are subject to leaching with the subsequent production of mobile contaminants.
2. The presence of fractured or fissured materials.
These materials permit the rapid spread of contamination because of their high permeability and the absence of appreciable attenuation of these contaminants. In addition, fractured or fissured dol-

nites are a major source of water in many parts of Illinois and in these areas its presence assumes particular significance.

3. The presence of sand and/or gravel deposits.
The spread of contaminants through sand or gravel deposits is generally less than through fractured or fissured rocks, because their permeability is generally lower and the attenuation of contaminants is more effective. The spread of contaminants through sand and gravel deposits is, however, unlikely to be greater than through finer-textured materials, such as silt or clay.

4. The presence of fine-grained materials.
Fine-grained materials such as silts and clays have low permeability and may appreciably attenuate contaminants which come in contact with them.

5. Direction of ground-water movement.
The general direction of movement of contaminants in the ground will be in the direction of ground-water flow.

Natural flow patterns can be changed by the pumping of water from the ground-water reservoir. Data on ground-water pumping and water level effects due to pumping are the responsibility of the Illinois State Water Survey.

A visit was made to each of the three sites in Cook County listed below, on September 14, 1964. The geologic evaluation of each site is as follows:

Site 1-T35W, R1E, SE Sec. 15, NW Sec. 22. According to the 1950 edition of the Illinois City 7½ Quadrangle map, the ground surface is very flat in the SW of Section 15 with the exception of a higher area in the southeastern corner. This high area extends across the SE of Section 22, and is bedrock controlled as evidenced by a bedrock exposure in the southeastern corner of Section 15. The flat area is presently farmland while houses and industrial buildings occur on the high area.

Surface drainage occurs in the SW of Section 15 as a dredged channel and as the southern end of Third Creek, an intermittent stream that flows northward from the area. The occurrence of these surface waters on the

flat land suggest a near surface saturation condition. This being the case, land fill operations requiring excavation would probably result in refuse lying in or near the zone of saturation. Direction of shallow ground-water movement is expected to be in a northwesterly direction to Third Creek. The Hydrologic Investigations, Area 8W-32, published by the United States Geological Survey (1950), has mapped the dredge channel and Third Creek as flooded in 1957 at the northwestern corner of the site. However, this flooding was limited to their respective channels.

Regional geological and soils mapping (Brota, J. H., 1950-52, "Surficial Geology of the Calumet City Quadrangle", Illinois State Geological Survey; Ellwood, R. E., 1963, "Character of the Surficial Materials of Northeastern Illinois-a Regional Geotechnical Study", unpublished manuscript, Illinois State Geological Survey files; and Ellwood, G. L. and Lazar, J. S., 1964, "Sand and Gravel Resources of Northeastern Illinois", Circular 352, Illinois State Geological Survey), describe the surficial materials in the flat land area as consisting mainly of fine-textured silts and clays with relatively low permeability which were deposited in a glacial lake bottom and the surficial materials in the higher areas in the NW of Section 22 and the SE corner of Section 15 as silty clay till.

Regional subsurface maps in the files of the State Geological Survey indicate that the glacial drift in this area is less than 50 feet thick. At the site itself the drift ranges in thickness from 0 (at the cuttop) to approximately 40 feet. In the NW Section 15, 10 to 25 feet of sand and gravel has been mapped at the base of the drift overlying the Silurian dolomite aquifer. Confirmatory borings should be made to the Silurian dolomite aquifer at the site to precisely determine the thickness and composition of the drift materials.

The State Geological Survey has records of 15 water wells within one-half mile of the site. These wells produce from the Silurian dolomite aquifer. Our records are not complete and other wells producing from the glacial drift or the Silurian dolomite may exist in the area.

In summary, the surficial deposits at this site are composed predominantly of fine-textured silts and clays with relatively low permeability. However, some sand and gravel deposits are probably present at the base of the drift. The thicknesses of the glacial drift overlying bedrock can be expected to be quite variable, ranging from 0 to approximately 50 feet in thickness, as bedrock is exposed in the southeastern corner of Section 15. Borings should be made to accurately describe thickness and composition of the drift materials. Excavation for landfill operations will probably encounter the zone of saturation. There is also a possibility of flooding in the immediate vicinity of Third Creek and the dredge channel in the NW of Section 15.

Site 2-217-424B, S1 Sec. 24, Milne, 25. The surface of this site was originally flat uncultivated land, however, it has been extensively modified by trenching, sand removal, and dumping operations and is now fairly irregular. According to the 1960 edition Lake Calumet 7½ Quadrangle map, the site is less than five feet above the water level of Lake Calumet and the Calumet River. It may therefore be subject to flooding.

Regional geological and soils mapping (Peck, R. B. and Reed, W. A., 1954, "Engineering Properties of Chicago Subsoils", University of Illinois Bulletin No. 44, Engineering Experiment Station Bulletin No. 422; Froeh, J. R., 1939-42, "Surficial Geology of the Calumet Lake Quadrangle", Illinois State Geological Survey; Elwood, R. B., 1963, "Character of the Surficial Materials of Northeastern Illinois-A Regional Geotechnical Study", unpublished manuscript, Illinois State Geological Survey files), indicates that the surficial materials at this site consist mainly of sand which is part of a fairly extensive deposit extending to the east, north, south, and possibly to the west. This sand can be seen to a depth of approximately ten feet in excavations at this site.

Regional maps in the files of the State Geological Survey indicate that the glacial drift in this area is approximately 60 feet thick and, excluding the surficial sand deposit, consists predominantly of fine-textured lake clays or glacial till with relatively low permeability overlying the Silurian dolomite aquifer. There are no records of borings at this site in the files of the State Geological Survey, however, there are some records in the northern part of Section 26, south of the site. This data indicates that the surficial sand is approximately 12 feet thick. The surficial sand at the site may also approximate this thickness. For accurate data as to the thickness and composition of the drift materials at the site, borings will have to be made.

Water was observed in excavations on the site at a depth of approximately three feet within the surficial sand. Refuse disposed below this level will be below the top of the zone of saturation. The direction of ground-water movement is not known. It is likely however that direct hydrologic connection exists between groundwater at the site and Calumet Lake and the Calumet River through the surficial sand deposit.

The Geological Survey has records of only one water well within a mile of this site. This well produces from the Silurian dolomite aquifer beneath the glacial drift. Our records are not complete however, and other water wells may exist in the area.

In summary, the surficial deposits at this site consist of permeable sand approximately 12 feet thick which overlies about 50 feet of fine-textured materials with relatively low permeability above the Silurian dolomite aquifer.

ser. Subsurface information is not considered adequate in this area and confirmatory borings are recommended. Refuse disposed in excavations is likely to lie below the zone of saturation and as the site is in a low area it may be subject to periodic flooding.

Site 3-T26N, R11K, NE¹/4 Sec. 24. According to the 1950 edition of the Calumet City 7½' quadrangle map, the ground surface is very flat and lies approximately 75 feet above the Little Calumet River, which cuts across the southeastern tip of this triangular area. Ground-water movement is expected to be in a southerly direction towards this river. The area is presently farmland with the exception of houses along the south side of 159th Street. There were no exposures present in the immediate area; however, an abandoned clay pit located one-half mile to the southeast showed the presence of a stony clay in the spoil banks. The Hydrologic Investigations, Atlas PM-52, published by the United States Geological Survey (1959) has mapped the Little Calumet River as flooded in 1957, to approximately 10 feet above its normal level.

Regional geological and soils mapping (Prota, J. H., 1930-32, "Glacial Geology of the Calumet City Quadrangle", Illinois State Geological Survey; Illinois, R. I., 1963, "Character of the Surficial Materials of Northeastern Illinois-A Regional Geotechnical Study", unpublished manuscript, Illinois State Geological Files; and Ebley, G. E., and Lazar, J. A., 1964, "Sand and Gravel Resources of Northeastern Illinois," Circular 359, Illinois State Geological Survey), describe the surface materials as consisting mainly of fine-textured silt and clay, probably lacustrine, having relatively low permeability. A more permeable cutwash sand and gravel is present in the extreme northeastern corner of Section 24, the northeastern corner of the site.

Regional subsurface maps in the files of the State Geological Survey indicate that the glacial drift in this area is approximately 100 feet thick. In the SE¹ of Section 24, south of the site, 15 to 50 feet of sand and gravel is present at the base of the drift overlying the Silurian dolomite aquifer. A minor deposit of sand and gravel is interbedded within the drift in the SE¹ of Section 24, also south of the site.

The State Geological Survey has records of 5 water wells within one-half mile of the site. These wells produce from the Silurian dolomite aquifer. Our records are not complete and other wells producing from the glacial drift or the Silurian dolomite may exist in the area.

In summary, the surficial deposits at this site are composed predominantly of fine-textured silts and clays with relatively low permeability. These deposits probably have a minimum thickness c. 50 feet, with the exception of a surface sand and gravel at the extreme northeastern corner of the site. The silt and clay deposits overlie more permeable sand and gravel deposits at the base of the 100 foot thick glacial drift immediately south of

the site in question. Drilling at the site is recommended to more accurately determine the thickness and character of the drift materials. Excavation for landfill operations may encounter the zone of saturation. There is also a possibility of limited site flooding near the Little Calumet River.

Sincerely,

Ronald A. Landon
Assistant Geologist
Northeast Illinois Field Office
Section of Ground Water Geology
and Geophysical Explorations